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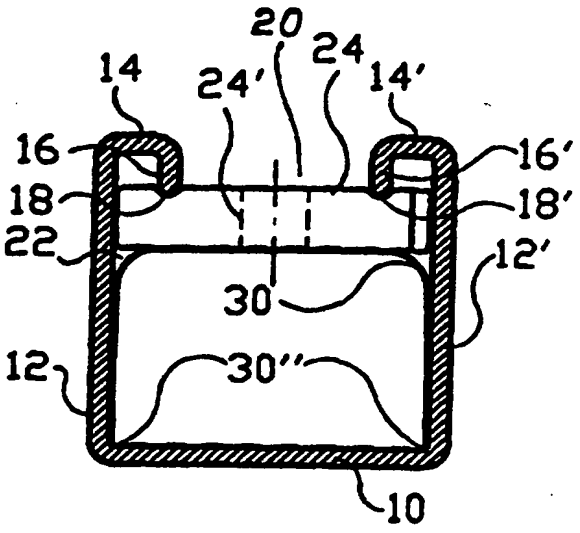
(54) Title: A METHOD AND A DEVICE FOR FITTING-UP A NUT ON AN ANCHOR RAIL

(57) Abstract

A device and a method for use when fitting elongated, rectangular nuts (24) within a cavity (22) defined by a U-shaped anchor rail (12, 10, 12') having spaced opposing flange portions (14, 14') defining therebetween an insertion slot (20) for the nut (24). Said insertion slot (20) allows the passage of the nut (24) in one nut orientation only. The rail cavity's (22) lateral dimension exceeds the larger dimension of the nut (24). A suitable counterpressure-generating member for the nut (24) is desired, in order to exert a counterpressure on the nut (24) from the nut side facing the web portion (10) of the U-rail (12, 10, 12'). To this end, said counterpressure-generating member is constituted by a flexible/bendable, rectangular, sheet-like, plate-shaped body (30) inserted into the anchor rail (12, 10, 12'), resting supportingly with opposite edges (30") in the internal corner edge portions within the anchor rail (12, 10, 12'). The nut (24) rests resiliently on said body (30), exerting a desired counterpressure force whenever a screw bolt is threaded thereinto to act as a fastener.



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A METHOD AND A DEVICE FOR FITTING-UP A NUT ON AN ANCHOR RAIL

The present invention relates to a method and a device for use when fitting-up nuts on an anchoring member in the form of a socalled anchor rail, which comprises an elongated rail body having a substantially U-shaped cross-section, the free edges of the side walls of the U-legs having mutually opposing flanges, the free edges thereof defining an elongated, in the rail body's longitudinal direction preferably through-going inserting slot for the passage of said nuts into the cavity of the rail, said inserting slot having a lateral dirension which is considerable smaller than the corresponding dimension of the cavity of the rail, and wherein each edge portion of said flanges preferably pass into an outer flange portion directed towards the U-web (the bottom wall of the rail), and wherein the free edges of said outer flange portions may be formed for positional blocking engagement with grooves or the like formed in the adjacent gable/end face of the nuts when the respective nut occupies the functional position thereof.

The U-leg-side walls of the rail are connected by means of the U-web or bottom wall, "side" and "bottom" referring to the design of the anchor rail, not to the the rail's positions of use in space. For the sake of simplicity, simplified terms such as side walls and bottom wall will be used.

Such anchor rails are used to a large extent in industry for anchoring and suspending e.g. cable paths, attachment members and the like. For the cooperation with such anchor rails, a special, rectangular nut has been developed, the nut having rounded corners, causing the nut to be passed through the inserting slot of the rail, the nut being self-locking subsequent to a 90° rotation around the axis of its own. By means of the nut and a screw bolt cooperating therewith, a suspension bracket or similar supporting member can be attached thereto.

Known nuts for anchor rails are provided with a screw spring, one end thereof being attached to one gable/end side of the nut, so that the spring will be yielding a resilient counter force during the screwing of the screw bolt. When the bolt connection has been established, the spring has not longer any function.

It is a great problem that the springs each attached to a nut of its own become entangled within the package. Thus, it is cumbersome and time-consuming to release entangled spring-equipped nuts. Also, it is expensive to produce and attach the individual springs. A further disadvantage is that socalled anchor rails exist in two different dimensions, namely with a side wall height equal to 41 mm and to 21 mm. Thus, the width of the rails and the shape of the nuts are the same as before, but due to the difference of height two different spring lengths have to be used. This necessitates the use of packages for different spring lengths in addition to packages for different nut thread diameters.

Also, it is a disadvantage that the spring closes the rail cross-section and prevent cable pulling within the cavity of the rail - in the longitudinal direction thereof - simultaneously as the springs rapidly corrode. In order not make the nut-spring-combination too expensive, the springs are produced in a cheap material of bad quality, making a poor visual appearance of the plant when rust water

is flowing and, thereafter, is in the course of drying along the anchor rails, discolouring these.

When a nut has been placed within the anchor rail and one desires to displace the nut along the length of the rail, this may often be problematic, particularly if the rail is provided with holes in the bottom wall. This is due to the fact that the spring easily get stuck on hole-defining edge portions, with the result that the nut gets out of position.

Therefore, the object of the present invention has been to eliminate or to a substantial degree reduce the deficiencies, disadvantages and restrictions of use associated with known and conventional technique and, thus, provide a method and a device for use upon fitting-up nuts on anchor rails of the kind defined, with which rational and efficient and also simplified and cheap fitting-up operations are obtained, as well as correspondingly advantageous constructive equipment.

Thus, it is previously known to assign such a nut a resilient counterforce-generating means (the spring) carrying out its functions upon screwing in a screw bolt dimensioned according to the internal bore of the nut.

In accordance with the present invention, said resilient counterpressure-generating member consists of a thin, bendable and flexible, plate-shaped member of e.g. plastic, cardboard, paperboard or steel, e.g. having a rectangular circumferential shape. As a pure example, the dimensions of this plate-shaped counterpressure-generating member may be 7 x 5 cm. In accordance with an important feature of the method according to the invention, this flexible counterpressure-generating member is bent (perpendicular to the lateral axis) and pushed down into the cavity of the anchor rail, so that the plate-shaped counterpressure-generating member follows the inside of the side walls of the rail and supports itself with the free ends pointing in the longitudinal direction of the rail.

In a bent and pushed-in condition, the flexible counterpressure-generating member's free central part will curve convexly upwardly, at a certain distance from said mutually opposing flanges of the anchor rail.

With the flexible, plate-shaped counterpressure-generating member in this position, with the free central part arched upwardly, a special nut is placed such that it rests against the arched central part of the flexible counterpressure-generating member. The nut is inserted through the inserting aperture of the rail, the smallest nut dimension orientated, as previously known, in the longitudinal direction of the inserting aperture. Thereafter, the nut is turned 90° around its own axis, preferably by means of a special mounting pin, the end thereof being shaped as to be capable of engaging into the internally threaded bore of the nut during the rotation of the same.

During this nut inserting operation, the nut presses axially in the direction towards the bottom wall of the rail, the flexible, plate-shaped counterpressure-generating member's upwardly arched central portion becoming more or less flattened as a reaction thereto, subsequently taking a stable position, supporting the nut in a way in which the resilience is very much restricted, a desired and advantageous support of the nut during the following screwing of the screw bolt into the nut. When the nut is orientated in this functional position, the free edge portions of the outer flanges engage into grooves or the like, formed in the gable/end face of the nut facing upwardly.

Thereafter, a screw bolt is screwed into the nut as known per se, the flexible, plate-shaped counterpressure-generating member supporting the nut, simplifying and favouring the screwing of the bolt as known per se. However, the flexible counterpressure-generating plate will provide a stable support substantially covering the entire adjacent gable/end face of the nut, while the known screw spring only supports

a limited, central portion of the respective nut, so that the nut may carry out undesired tilting movements about the axis of the screw spring during the screwing of the bolt.

Flexible, plate-shaped counterpressure-generating members according to the invention can be made in a cheap design of plastic or very thin stainless materials, so that rust growth is avoided.

An important advantage of the flexible, plate-shaped counterpressure-generating members according to the invention - contray to the known screw springs situated centrally within the anchor rail - is that the first-mentioned members scarcely limit the cross-section of the rail cavity, so that the rail cavity will be open for the passage of conduits, cables, hoses or the like. The former problem associated with tangled nuts and springs has been solved, the flexible counterpressure-generating plates being e.g. disposed in a stack of their own in the package/box substantially containing the nuts.

If the work includes anchor rails having varying heights, e.g. 21 cm respectively 41 cm, elongated flexible counterpressure-generating or supporting plates must be used. In an anchor rail having a height equal to 21 cm, the counterpressure-generating respectively supporting plate is placed with its longer side edges along the longitudinal sides of the anchor rail, while the same plate is orientated 90° turned within 41 cm high anchor rails. Thus, one may use identical flexible counterpressure-generating plates both for 41 and 21 cm anchor rails.

If one, subsequent to having placed the nut on the plate from above, desires to displace the nut along the anchor rail, the nut and the associated counterpressure-generating plate are displaced simultaneously in a simple and stable way; apertures formed in the bottom wall of the rail do not at all engage the counterpressure-generating plate which

moves along the outermost portions of the bottom wall.

Further objectives, advantages and features of the invention will appear from the following description of partly prior art technique, partly method features and constructive features of the present invention, here represented by examples of embodiments illustrated in accompanying drawings, wherein:

Figure 1 shows an anchor rail in a lateral cross-section perpendicular to the longitudinal axis of the anchor rail;

Figure 2 shows the very same cross-section, where a known rectangular nut with a screw spring mounted thereon is fit up in functional position with its longest dimension orientated in the lateral direction of the anchor rail, grooves in the upper nut gable face being in engagement with the downwardly directed free edge portions of the outer flanges of the anchor rail, and wherein the screw spring constitutes the counterpressure-generating means of the nut upon screwing a screw bolt into the nut;

Figure 3 shows a flexible, plate-shaped, preferably rectangular, springy counterpressure-generating member formed in accordance with the present invention;

Figure 4 is a lateral cross-section perpendicular to the longitudinal axis of the anchor rail according to the invention, bent and placed in functional position within the anchor rail in accordance with an important feature of the method according to the invention;

Figure 5 shows a cross-section corresponding to figure 4, where a rectangular nut having two diagonally oppositely directed roundings has been placed with its shortest dimension orientated in the lateral direction of the anchor rail;

Figure 6 corresponds to figure 5, but here the nut is turned 90°, and the central arched portion of the flexible counterpressure-generating plate has been more or less flattened from the condition shown in figure 5, the bent, uppermost somewhat flattened counterpressure-generating plate supports the nut substantially across the entire adjacent gable side face thereof, chamfered grooves in the opposite gable side face of the nut have been brought into locking engagement with the downwardly directed free edge portions of the anchor rail's outer flanges;

Figure 7 corresponds to figure 6, but here a screw bolt has been screwed into the nut, the screw bolt carrying plate-shaped coupling means for e.g. suspending brackets, cable paths, attachment members or the like. Here, the free end of the screw bolt has pressed the flexible counterpressure-generating plate down in the direction towards the bottom wall of the anchor rail, but this is quite insignificant, because the counterpressure-generating plate exerts its function during the screwing of the screw bolt only; thereafter it serves no task;

Figure 8 shows a top plan view of figure 5;

Figure 9 shows a top plan view of figure 6;

Figure 10 is a lateral cross-section illustrating the use of a mounting pin formed with a head portion tapering conically towards the free end thereof, the pin being formed and shaped with a view of being used during the nut's fitting-up within the cavity of the anchor rail;

Figure 11 corresponds to figure 10, but here the flexible counterpressure-generating plate, the nut and the mounting pin are shown when the nut's fitting-up has been completed and the mounting pin can be removed;

Figure 12 shows bending and pushing-in of a rectangular,

flexible counterpressure-generating plate in an anchor rail having a substantially reduced height;

Figure 13 corrssponds to figure 8, but here the counterpressure-generating plate and nut have been disposed within an anchor rail according to figure 12;

First, reference is made to figure 1 for the description of the shaping and design of the anchor rail:

A socalled anchor rail has a substantially U-shaped cross-section, the longitudinal course being adapted to the prevailing conditions and to the requirements and wishes existing at any time.

In the present description, the following terminology has been used as far as the anchor rail is concerned: The wall 10 corresponding to the U-web is designated the bottom wall, The walls 12, 12' corresponding to the U-legs are designated the side walls. The side walls 12, 12' have oppositely directed, opposed (first) flanges 14, 14' each passing into an outer flange 16, 16'. The outer flanges 16, 16' are mutually parallel, and their free end edges 18, 18' are directed towards the bottom wall 10.

The opposing inner faces of the outer flanges 16, 16' define an inserting slot 20 preferably through-going in the longitudinal direction of the anchor rail and allowing insertion of a nut as well as a counterpressure-generating member for the nut, both of which are to be mounted to the anchor rail, withdrawn into the cavity 22 thereof.

A nut 24 of the kind to be fit-up on the anchor rail, appears e.g. from figure 8 in connection with figures 5 and 6. The circumferential shape of the nut 24 is oblong and substantially rectangular, except for two diagonally opposite corner portions 26, 26' which are rounded or cut away. This rounding is made in order to allow the nut 24,

subsequent to its insertion into the cavity 22 of the anchor rail, to be turned 90° and, thereafter, to be self-locking.

Now, reference is made to figure 2 for a brief explanation of prior art technique: The nut 24 is shaped as shown in figures 5, 6 and 8, and to one gable side face thereof is attached one end of a screw spring 28 constituting said springy counterpressure-generating means for the nut 24, i.e. said means is serving to give a very much limited elastically resilient support for the nut 24 during the screwing of a screw bolt into the same. An account of the disadvantages of such a screw spring-shaped resilient counterpressure-generating member has been given previously.

The nut's 24 central, internally threaded bore is denoted at 24'.

The springy counterpressure-generating member for the nut in accordance with the present invention differs fundamentally from the known screw spring-like embodiment, and is shown in a perspective view in figure 3.

According to the exemplary embodiment, the resilient counterpressure-generating member for the nut consists of an elongated, rectangular, flexible, plate-shaped member 30, the long sides thereof being denoted at 30' and its short sides at 30".

With anchor rails having the largest standard height equal to e.g. 41 cm (all figures except figures 12 and 13), such a flexible, plate-shaped ounterpressure-generating member bent about its imaginary lateral axis and in this bent shape pushed into the cavity 22 of the anchor rail through the inserting aperture 20, until its opposite short side edges 30" come to rest supportingly within the internal transition portions between the bottom wall 10 the and respective side wall 12, 12' of the anchor rail. In an uninfluenced condition or upon an unsignificant pressure influence (Figure 4

respectively 5), the flexible, plate-shaped counterpressure-generating member 30 takes a self-fixing position, where the central portion curves uniformly convexly upwardly, for a restricted elastically resilient support for a nut 24 to be anchored to the rail, the flexible counterpressure-generating plate 30 is somewhat compressed during the 90° rotation of the nut 24 to the functional position thereof (e.g. figure 6), whereafter the flexible counterpressure-generating plate 30 exerts the main function thereof, namely to effect a limited elastical resilience and support upon the subsequent screwing in of a screw bolt 32, see figure 7, where the bolt head is denoted at 32'.

In order to let the nut 24 in its functional position obtain a stable connection to the free edges 18, 18' of the anchor rail, one gable side face of the nut 24 is formed with two parallel grooves 44, 44' corrugated or machined in any other way and have a mutual distance corresponding to the distance between the free end edges 18, 18' of the outer flanges 16, 16', as well as formed to be brought into mutual engagement with these in the functional position of the nut 24. Such a device is previously known in connection to the arrangement illustrated in figure 2.

According to figure 7, the screw bolt 32,32' serves e.g. to anchor an angular bracket or the like 34,36 to the anchor rail, reference numeral 34' denoting an oblong aperture in one angular leg 34. To such attachment means, brakets or the like 34,34',36, for example a cable path, fastening means or the like (not shown) may be fixed.

In figures 10 and 11 is illustrated the use of a special mounting pin 38 for the fitting-up of the nuts 24. The mounting pin 38 has a head portion 40 tapering conically towards the free end thereof, said head portion 40 being pressed into the nut's 24 internally threaded bore 24', which has a smaller diameter than the largest lateral measure of the head portion 40, temporarily maintaning the

nut 24 during the handling thereof until the final functional position is reached, figure 11. The nut is passed in through the inserting aperture 20 of the anchor rail, to rest against the flexible counterpressure-generating plate 30, and further in the direction towards the bottom wall 10 of the anchor rail by means of the mounting pin 38,40 until the upper gable face of the nut 24 has arrived at a level which is situated a little lower than the free end edges 18, 18' of the outer flanges 16, 16', during which the flexible counterpressure-generating plate 30 is pressed down in an elastically resilient way, figure 10. Thereafter, the mounting pin 38,40 together with the nut fastened temporarily thereto is rotated 90° around their common axis, and at the end of this rotational movement, the laterally corrugated grooves of the nut 24 will engage the free, downwardly directed end edges 18, 18' of the outer flanges 16, 16', as known per se.

The head portion 40 of the pin has in front a conical insertion point 42 which is used when the internally threaded bore 24' has a smaller diameter. If desirable, the counterpressure-generating plate 30 may be provided with a central aperture (not shown) through wich the insertion point 40,42 of the mounting pin 38 possibly may extend.

In the bottom wall 10 of the anchor rails, e.g. longitudinal, oblong openings 46, which i.a. may be used as passage for bolts upon fastening of the anchor rail e.g. to a wall.

In figure 12, a flexible, rectangular, plate-shaped counterpressure-generating member 30 having accurately the same dimensions as in the remaining figures, used in connection with an anchor rail having a significantly reduced height in relation to ther anchor rail shown e.g. in figures 1, 2, 4, 5, 6, 7, 10 and 11.

As the flexible, plate-like, rectangular counterpressure-generating member 30 has an elongate, rectangular

circumferential shape, it can, without modifications, also be used in connection with such low anchor rails, where the bottom wall is denoted at 10a, the side walls at 12a, 12a', the opposing flanges at 14a, 14a' and the outer flanges bent 90° thereto at 16a, 16a'. Here, the counterpressure-generating plate 30 is mounted by being bent around the imaginary longitudinal axis of the plate and, in this condition, pushed in into the interior of the anchor rail until the longitudinal end edges 30' comes to rest supportingly within the internal transition area between bottom wall 10a and the respective side wall 12a respectively 12a'. Thus, flexible, rectangular counterpressure-generating plates 30 may, in one size and shape, be used for at least two anchor rails having substantially differing cross-sections.

When a flexible, rectangular, plate-shaped counterpressure-generating member has been pushed into the interior of the anchor rail and positioned with its longitudinal side edges 30' (Figure 12) or lateral side edges 30" to rest against the internal transition portions between bottom wall and side walls of the anchor rail, the flexibility of the counterpressure-generating member will ensure that it is kept in the pushed-in position, from where it, from below supported side edges, effects the desired restricted elastically compliant support of the nut 24 upon the screwing of the screw bolt 32,32', Figure 7.

C l a i m s

1. A device for fitting-up nuts (24) on an anchoring member in the form of a socalled anchor rail which comprises an elongate rail body exhibiting a substantially U-shaped cross-section, free edges of the U-leg-side walls (12, 12'; 12a, 12a') thereof having mutually opposing flanges (14, 14; 14a, 14a'), the free edges thereof defining an elongate inserting slot (20), preferably through-going in the longitudinal direction of the rail body, for the insertion of the nuts (24) in the cavity (22) of the rail, said inserting slot (20) having a lateral dimension which is substantially smaller than the corresponding dimension of the cavity (22) of the rail, and where each edge portion of said opposing flanges (14, 14'; 14a, 14a') preferably passes into an outer flange portion (16, 16'; 16a, 16a') directed towards the U-web (the rail bottom wall 10), and where, upon each nut's (24) fitting-up and during the subsequent bolt screwing operation, a counterpressure-generating member is disposed in the cavity (22) of the rail, said counterpressure-generating member providing the support of the nut (24) during the screwing in of said bolt (32,32'), c h a r a c t e r i z e d i n that said counterpressure-generating member is a flexible/bendable, plate-shaped member (30).

2. A device as set forth in claim 1, c h a r a c t e r i z e d i n that the flexible/bendable, plate-shaped member (30) is elongatedly rectangular.

3. A device as set forth in claim 1 or 2, c h a r a c t e r i z e d i n that the flexible/bendable, plate-shaped member (30) is provided with a central aperture for possible accommodation of the insertion point (40,42) of a mounting pin (38).

4. A method for use in connection with a device for fitting-up nuts (24) on anchor rails as set forth in claim 1 c h a r a c t e r i z e d i n that the flexible/

bendable, plate-shaped, preferably elongatedly rectangular counterpressure-generating members (30) are bent symmetrically (around longitudinal/lateral axis) and are pushed into the interior (22) of the respective anchor rail, so that two opposite side edges of each individual counterpressure-generating member (30) come to rest supportingly against the internal transition portion between the rail's bottom and side walls (10; 10a and 12, 12'; 12a, 12a', respectively).

5. A method for use in connection with a device for fitting-up nuts (24) on anchor rails as set forth in claim 2, where the anchor rails in one anchoring system have a larger/smaller height than the anchor rails of another anchoring system, c h a r a c t e r i z e d i n that each single flexible/bendable, plate-shaped, elongatedly rectangular counterpressure-generating member (30), in connection with the lower and less deep anchor rails (Figures 12, 13) is bent symmetrically about the longitudinal axis, and, in connection with higher and deeper anchor rails, is bent symmetrically about the lateral axis, whereafter the respective bent counterpressure-generating member (30) is pushed into the interior of the respective anchor rail until two opposite side edges come to rest supportingly against the internal transition portions between the rail's bottom and side walls (10; 10a and 12, 12'; 12a, 12a', respectively).

6. Use of a nut-mounting pin for individual fitting-up nuts (24) in anchor rails in accordance with the above, said nut-mounting pin having one or more head portions (40, 42) tapering conically towards the free end thereof, said head portion(s) being adapted to cooperate engagement-nullifyingly with the internally threaded bore (24') of the nut (24).

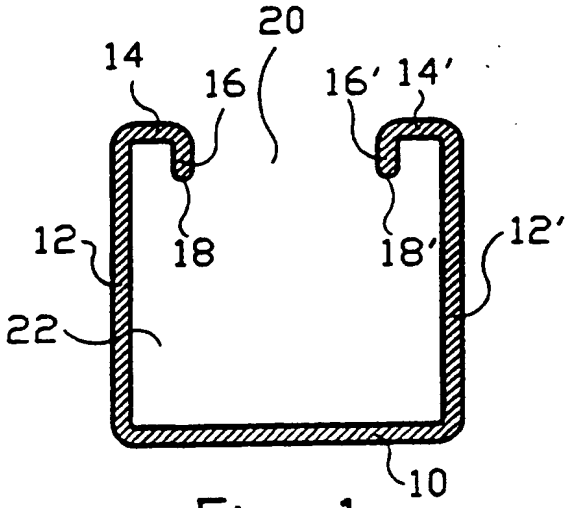

Fig. 1

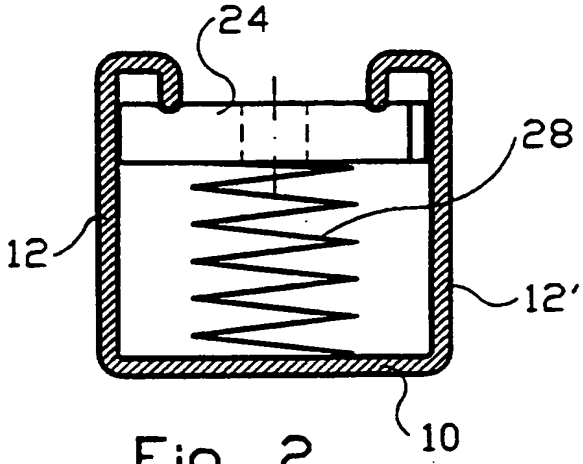

Fig. 2

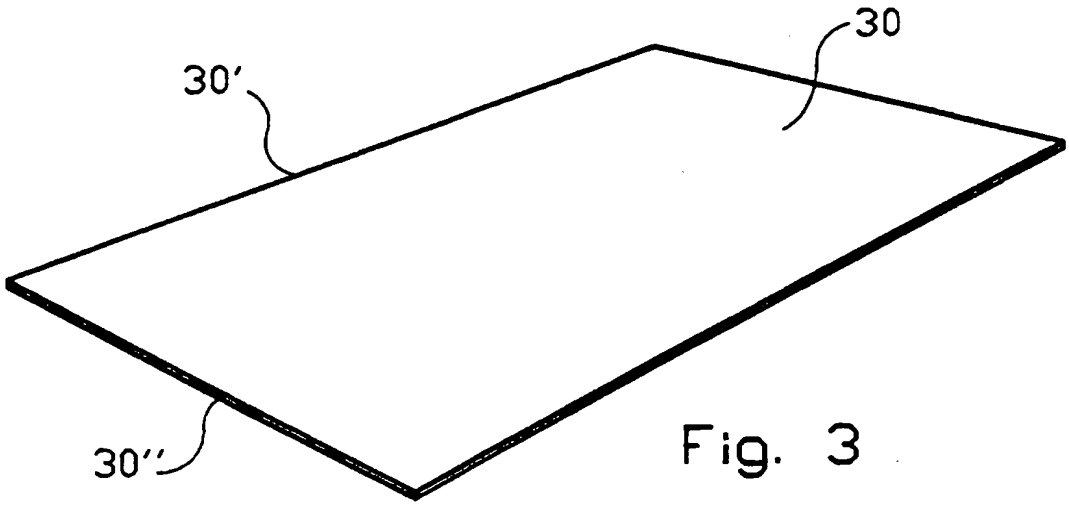

Fig. 3

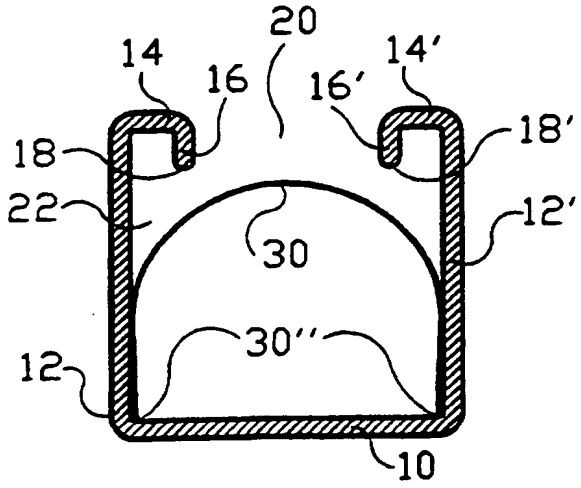

Fig. 4

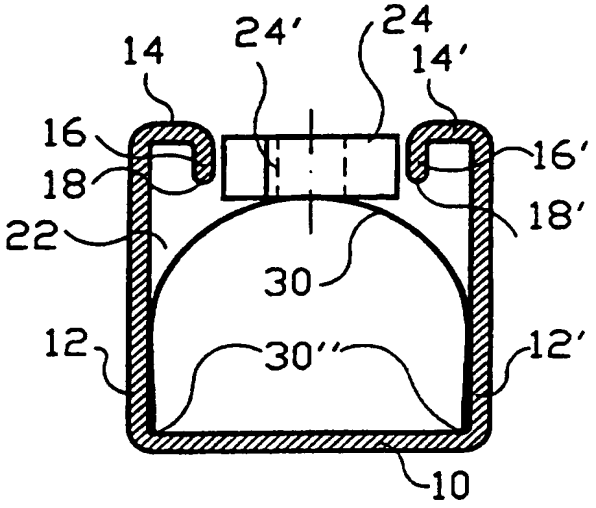

Fig. 5

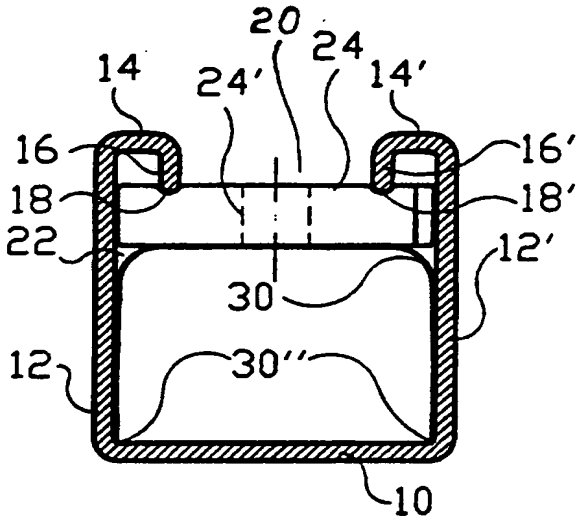

Fig. 6

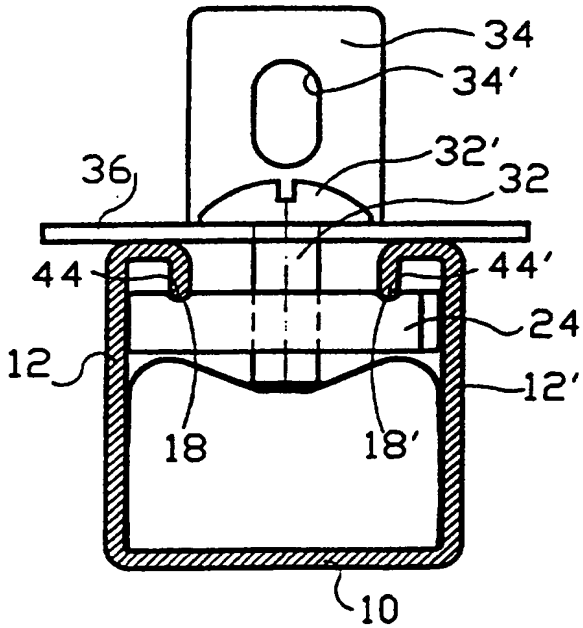

Fig. 7

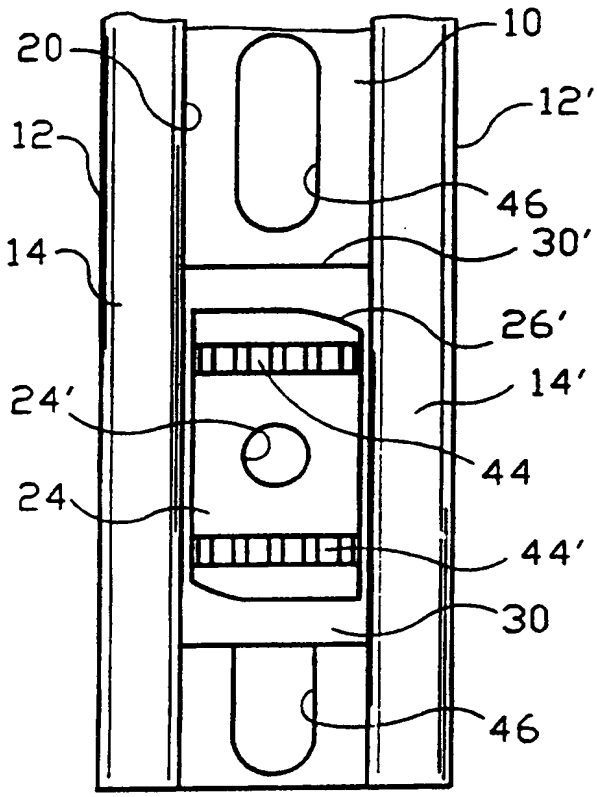

Fig. 8

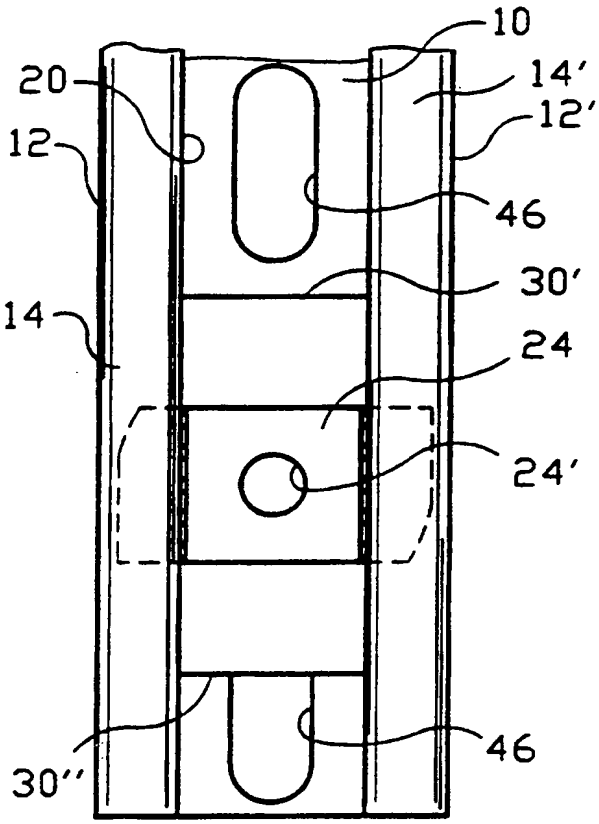

Fig. 9

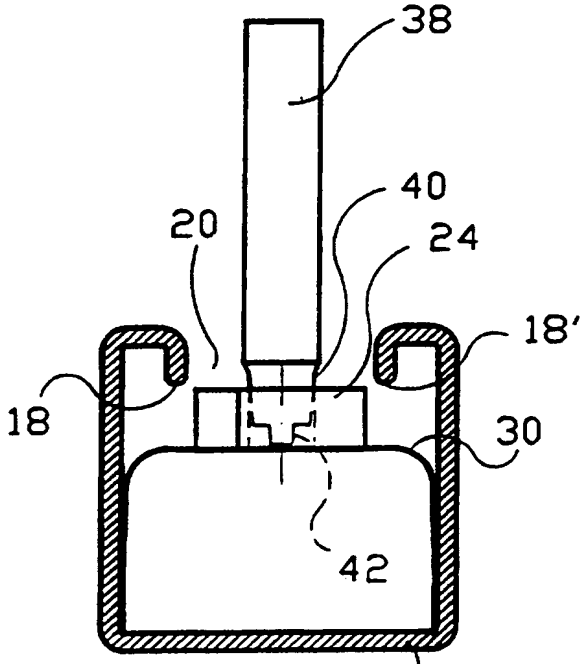

Fig. 10

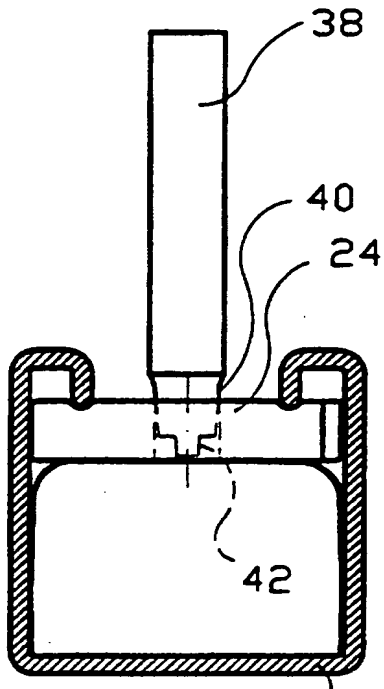

Fig. 11

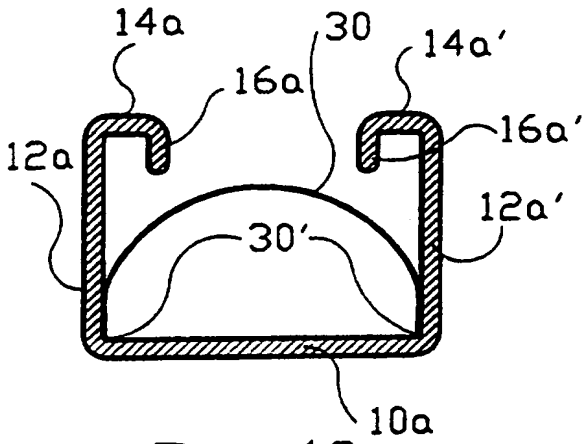

Fig. 12

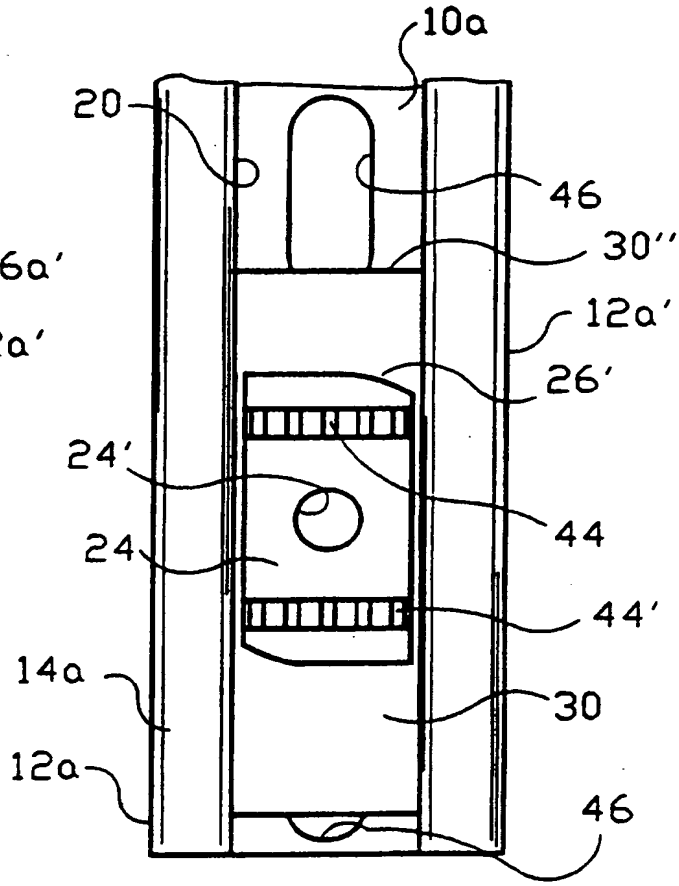

Fig. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 96/00091

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: F16B 37/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: F16B, F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4575295 A (REBENTISCH), 11 March 1986 (11.03.86), figure 15	1,2
	--	
Y	GB 602540 A (HARRY CRUDEN), 28 May 1948 (28.05.48), figure 1	1,2
A	figure 2	4,5
	--	

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 1996	18 -07- 1996
Name and mailing address of the ISA/	**Authorized officer**
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Inger Löfving Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT
Information on patent family members

01/04/96

International application No.
PCT/NO 96/00091

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4575295	11/03/86	AU-B,B- 570088	03/03/88
		AU-A- 3649484	18/07/85
		CA-A- 1245886	06/12/88
		EP-A,A,B 0149128	24/07/85
GB-A- 602540	28/05/48	NONE	

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